

Nevada Technical Associates, Inc.

Radiation Safety Officer

Course Outline

Starting time: 8:30 each day.

The topics below will be more or less evenly distributed over the duration of the course.

1. Introduction
 - a. Course objectives and schedule
 - b. Origins of nuclear science
 - c. Atomic structure, isotopes, nuclear stability
 - d. Equations of radioactive decay
2. Radioactive Decay Processes
 - a. Alpha emission
 - b. Beta emission
 - c. Gamma emission
 - d. Other decay processes
 - e. Statistics of radioactive decay
3. Interaction of Radiation with Matter
 - a. Modes of interaction
 - b. Heavy charged particle interactions
 - c. Beta particle interaction
 - d. Gamma ray interaction
 - e. Neutron interaction
4. Radiation Detection and Measurement
 - a. Gas-filled chambers
 - b. Scintillation detectors
 - c. Semi-conductors
 - d. Photographic emulsions

5. Biological Effects of Radiation
 - a. Radiation quantities and units
 - b. Quality factors
 - c. Biological effects
 - d. Mechanisms of biological damage
 - e. Acute, whole-body gamma radiation
 - f. Risk of stochastic effects
 - g. Fatality rates in various industries
 - h. Radiation dose from natural and man-made sources

6. Shielding
 - a. Charged particle shielding
 - b. Photon shielding
 - c. Neutron shielding
 - d. Facility shielding

7. Personnel Radiation Dosimetry Devices and Methods
 - a. External monitoring
 - b. External dose evaluation
 - c. Internal monitoring
 - d. Internal dose assessment

8. Federal and State Regulations
 - a. Chronology of standards
 - b. Sources of standards, recommendations and requirements
 - c. Basis of Standards
 - d. Current regulations
 - e. Licensing procedures

9. Radiological Safety Surveys, Records and Documentation
 - a. Surveys and inspections
 - b. Radiological Controls and ALARA
 - c. Records and documents
 - d. Operating and emergency procedures and document control

10. Radioactive Material Transportation and Disposal Regulations
 - a. Applicable regulations
 - b. Categories, packaging and limits
 - c. Manifests, records, markings, and labels
 - d. Radwaste disposal methods, sites, records and regulations

11. Radiological Emergencies

- a. Definitions, classifications and phases
- b. Notifications and assistance
- c. Response: isolation, radiation and medical evaluations
- d. Review of accident causes and recent accidents

12. Drafting a Radiological Safety Plan (student exercise)

- a. Attendees prepare program
- b. Exercise review